THE GENERA OF OLEACEAE IN THE SOUTHEASTERN UNITED STATES

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THE OLEACEAE generally have been regarded as a natural family, but there seems to be no such agreement about their position within the sympetalous dicotyledons. Usually, however, the family is treated either as the sole member of the order Oleales or as constituting suborder Oleineae of the Gentianales (Contortae), aberrant within the order especially in the reduction of the stamens to two. The former view has been held by Wettstein, Rendle, and recently by Benson (who would, in addition, divide the Gentianales), the latter by Bentham and Hooker, Engler, Engler and Diels, Engler and Gilg, and (most recently) Cronquist, among others. Hutchinson has taken a more extreme position, splitting the Gentianales into three orders and aligning the Oleaceae with the Loganiaceae in his Loganiales. These varying viewpoints reflect both the perplexing similarities and the uncertainties of the interrelationships of the Oleaceae, Loganiaceae (including Buddlejaceae), Gentianaceae (including Menyanthaceae), Apocynaceae and Asclepiadaceae, the families usually grouped together here.

Although the questions of the ordinal position of the Oleaceae and of the interrelationships of many of the sympetalous families obviously require further consideration, our purpose here, beyond merely noting these problems, is to present data from a different level in the form of treatments of the genera of the Oleaceae as they occur in the southeastern United States, thus making some of the information concerning this interesting family more readily and immediately available. These treatments are a part of a biologically oriented generic flora which is being prepared for the southeastern United States as a joint effort of the Arnold Arboretum and the Gray Herbarium made possible through the interest and support of George R. Cooley and through a grant from the National Science Foundation. This paper follows the format and scheme set forth in the preceding papers and outlined in the first publication in the series.[1] As in the previously published papers, the descriptions are based upon the species of each genus which occur within the area bounded by and including North Carolina and Tennessee, on the north, and Arkansas and Louisiana, on the west; additional characters and supplementary information based upon other species are placed in brackets when included in the description. The abbreviations used in the citation of periodicals follow the general principles set forth by Lazella Schwarten and H. W. Rickett (Bull. Torrey Bot. Club **76**: 277–300. 1958). References which are included but which have not

[1] The previous papers in this series were published in Jour. Arnold Arb. **39**: 296–346. 1958 (woody Ranales); **40**: 94–112. 1959 (Nymphaeaceae and Ceratophyllaceae), 161–171 (Empetraceae and Diapensiaceae), 268–288 (Primulales).

been checked are followed by an asterisk (*). Annotations, when included, follow each reference and are inclosed by brackets. We are much indebted to many of our friends and colleagues in connection with all of this work on the flora of the southeastern United States. In connection with the Oleaceae, in particular, we are grateful to George R. Cooley for material of *Osmanthus* from the sand-pine scrub of central Florida.

OLEACEAE (Olive Family)

Trees or shrubs, sometimes climbing, with opposite, seldom alternate, simple or pinnately compound leaves, without stipules. Flowers regular, bisexual, rarely unisexual (the plants then dioecious or polygamous). Calyx 4(rarely more)-lobed, rarely wanting. Corolla 4(rarely more)-lobed, petals rarely almost free or wanting; aestivation imbricate or valvate, rarely contorted. Stamens 2 (rarely 3 or 4), epipetalous, alternate with the corolla lobes, the anthers dehiscing longitudinally, the pollen usually 3(4)-colpate. Pistil solitary, of 2 carpels, the style 1 or wanting, the stigma 2-lobed or simple, the ovary superior, 2-loculed, each locule with 2 (rarely 1–4) pendulous and anatropous, or ascending and amphitropous, ovules. Fruit a berry, drupe, capsule or samara. Seed with a straight embryo, the endosperm oily or wanting.

A family of 22–30 genera and over 400 species of the temperate and tropical regions of the world, but centered primarily in Asia and Malaysia. In our area it is represented by seven genera, three of which (*Syringa*, *Ligustrum*, *Jasminum*) were introduced as ornamentals but have since become established in our flora.

The family is distinguished by the usually four-parted perianth, the two epipetalous stamens, the two-loculed superior ovary, and the usually opposite, exstipulate leaves. On the basis of the position of the ovule and seed and the nature of the fruit, the family is divided into two subfamilies and three tribes. More recent cytological and morphological studies have resulted in a reclassification of the genera of the two subfamilies into seven tribes (cf. Johnson). Cytologically, the family may be divided into two groups: (1) genera with base chromosome-numbers of 11, 13, and 14; and (2) genera with base chromosome-numbers of 23 and 24. The 23-chromosome group corresponds largely to those genera placed in the subfamily Oleoideae and presumably represents a natural group. It has been postulated that the members of this group had a common origin from an allopolyploid ancestor. On the other hand, the genera with 11, 13, or 14 chromosomes form a heterogeneous assemblage corresponding roughly to the subfamily Jasminoideae, but including also *Forsythia* and *Fontanesia*, of the Oleoideae. The family is in need of very thorough cytological and morphological study of the species in order to establish clearer and more natural generic lines and subfamily groupings.

The family is best represented in our area in cultivation, where, in addition to species belonging to our native or naturalized genera, it also includes

species of *Fontanesia*, *Abeliophyllum*, *Forsythia*, *Phillyrea*, and *Osmarea* (*Phillyrea* × *Osmanthus*).

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KEY TO THE GENERA OF OLEACEAE

A. Flowers apetalous.
  B. Leaves pinnate; fruit a samara. ..... 1. *Fraxinus*.
  B. Leaves simple; fruit drupaceous. ..... 4. *Forestiera*.
A. Flowers with a distinct corolla.
  C. Corolla with elongate, nearly separate petals (united only at the base), white; fruit drupaceous. ..... 5. *Chionanthus*.
  C. Corolla evidently sympetalous, with a distinct tube.
    D. Flowers unisexual or bisexual, the plants dioecious or polygamous; fruit a drupe. ..... 3. *Osmanthus*.
    D. Flowers bisexual.
      E. Fruit a capsule, persistent; flowers usually lilac to purple, rarely white. ..... 2. *Syringa*.
      E. Fruit a berry persisting only a few months; flowers white or yellow.
        F. Corolla less than 1 cm. long, white, 4-lobed; fruit a 2-loculed berry with membranous to stony endocarp, not 2-lobed. ..... 6. *Ligustrum*.
        F. Corolla more than 1 cm. long, white or yellow, 4–9-lobed; fruit a 2-lobed berry (1 lobe sometimes aborting). ..... 7. *Jasminum*.

Subfam. OLEOIDEAE Knobl.
Tribe FRAXINEAE Endl.

1. **Fraxinus** L. Sp. Pl. **2**: 1057. 1753; Gen. Pl. ed. 5. 477. 1754.

Deciduous trees, rarely shrubs; leaves opposite, pinnately compound [or rarely simple]. Plants dioecious, polygamo-dioecious, or monoecious.

Inflorescences axillary on the branches of the preceding year, clustered or in panicles. Flowers apetalous [or petals 2–6], the calyx small, 4-parted, or wanting. Staminate flowers with 2 (rarely 3 or 4) stamens, the anthers oblong or linear, 4-loculed, dehiscing longitudinally. Pistillate flowers with 0–2 abortive stamens, the pistil with a single style, the stigma 2-lobed, the ovary with 2 pendulous ovules in each locule. Flowers perfect in *F. quadrangulata*. Fruit a 1(2)-seeded, flattened or terete samara. TYPE SPECIES: *Fraxinus excelsior* L. (*Fraxinus*, the ancient Latin name of the ash.) — ASH.

A genus of about 65 species in two sections and seven subsections, chiefly of the temperate regions of the Northern Hemisphere, centered primarily in North America, eastern Asia, and the Mediterranean region, but also extending southward into the tropics in the West Indies, Mexico, and Malaysia. The 12 species (recognized by Miller) of the United States and Canada, fall into sect. FRAXINUS, with the exception of *Fraxinus cuspidata* Torrey, of the southwestern United States, which is a member of sect. ORNUS (a group of about 26 species, chiefly of eastern Asia, with inflorescences terminal on leafy shoots). The seven species of our area belong to two subsections of sect. FRAXINUS.

Section FRAXINUS (§ *Fraxinaster* DC.), with axillary inflorescences on the branches of the preceding year, includes five subsections, four of which occur in the United States and two in our area.

Subsection FRAXINUS (subsect. *Bumelioides* Endl.), with flowers bearing a deciduous calyx, has about 15 species centered in the Mediterranean region, extending westward to central Asia. One species (*F. nigra* Marsh.) occurs in northeastern North America and in northeastern Asia (var. *mandschurica* (Rupr.) Lingelsh.). A single species, *F. quadrangulata* Michx., the blue ash, with 4-angled twigs, enters our region, ranging from Ontario, Michigan and Wisconsin, to Alabama, Arkansas and Oklahoma, in dry or moist, rich woods.

Subsection MELIOIDES Endl., with asepalous flowers, includes about 13 species of Central America, Mexico, the United States and Canada — five of which occur in our area — and two of central Asia. Our species of this subsection fall into two complexes distinguished primarily by the presence of papillae on the lower epidermis of the leaflets ("white ash complex") or by the absence of these papillae ("red ash complex"). Specific lines within the genus are difficult to define because of both genetic and ecological variation, as well as the difficulties resulting from hybridization and polyploidy. The distinctions between the various species have been based on the number, size, shape, margin, and pubescence of the leaflets; the shape of the leaf scars and of the terminal and lateral buds; and the size and shape of the samaras.

Fraxinus americana L. ($2n = 46, 92, 138$), the white ash, which occurs in rich woods from Minnesota to Quebec, to Nova Scotia, New England, Florida and Texas, is very variable in its leaf shape. Tests of various populations of this species indicate that it is composed of at least three ecotypes

which differ primarily in their resistance to cold damage but also in the pubescence of the leaves. The "southern" ecotype, which ranges from Maryland to southern Indiana and southward, has pubescent leaves with reddish petioles and midribs, and suffers severely from cold damage. Both the "northern" and "intermediate" ecotypes are more resistant to winter-killing and have leaves which are somewhat less pubescent.

Fraxinus pennsylvanica (including *F. Darlingtonii* Britton, *F. Michauxii* Britton, and *F. Smallii* Britton) ($2n = 46$), the red ash, which occurs in low woods and on stream banks from Quebec to Saskatchewan, south to Florida and Texas, is also variable in the shape and texture of the leaf, and in the shape of the samaras. Progeny tests indicate that named varieties based on pubescence do not merit taxonomic recognition since pubescent seedlings may be obtained from either pubescent or glabrous parents. Three ecotypes similar to those of *F. americana* have also been described for this species (Wright). *Fraxinus pennsylvanica* differs from *F. americana* in the papillose condition of the lower epidermis of the leaflets, in the shape of the leaf scars, in the shape of the terminal and lateral buds, and in the diameter of the samaras. The two ashes are also ecologically distinct, *F. pennsylvanica* occurring in low elevations often in the vicinity of lakes and streams, and *F. americana* occurring in higher elevations; only occasionally do the two come in contact.

The status of *Fraxinus biltmoreana* Beadle, the Biltmore ash, is in need of further investigation. It has been interpreted both as a result of the rare hybridization of *F. pennsylvanica* and *F. americana*, and as a pubescent variety of the latter (var. *biltmoreana* (Beadle) J. Wright ex Fern.).

Fraxinus caroliniana Mill. (including *F. pauciflora* Nutt.), the water ash. is a shrubby tree of the swamps and lowlands of the coastal plain from Florida to Texas, northward to Virginia. Although a number of variants based on leaf pubescence and samara shape have been named, and at least one (*F. pauciflora* Nutt.) has been given specific rank, it would appear that this species is merely extremely variable.

Fraxinus tomentosa Michx. f. (*F. profunda* Bush) ($2n = 138$), the pumpkin ash, of bottom lands from Florida to Louisiana, northward to New York, Ohio, Indiana, southern Illinois, and Missouri, is a species of very questionable status. It is not clearly differentiated from *F. pennsylvanica*, and is identifiable only by average measurements of a group of characters including the length and width of the leaflets, length and width of the samaras, and length of the stomata, styles and ovaries, all of which are greater in *F. tomentosa* than in *F. pennsylvanica*. Breeding experiments are needed in *F. tomentosa* to determine whether it is an autopolyploid of *F. pennsylvanica* or is of hybrid origin.

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Tribe SYRINGEAE G. Don

2. **Syringa** L. Sp. Pl. 1: 9. 1753; Gen. Pl. ed. 5. 9. 1758.

Deciduous shrubs or small trees; leaves opposite, simple. Inflorescences terminal or lateral panicles. Flowers bisexual. Calyx campanulate, 4-toothed. Corolla salverform, 4-lobed. Stamens 2, included or exserted. Pistil with a single style, the stigma 2-lobed, the ovary with 2 pendulous ovules in each locule. Fruit a loculicidal capsule with 2 seeds in each locule. TYPE SPECIES: *Syringa vulgaris* L. (The name from the Greek *syrinx*, a

pipe, originally applied to the genus *Philadelphus*[1] from the use of its branches for pipes, later transferred to this genus.) — LILAC.

A genus of about 28 species in two subgenera centered in western China, ranging east and north to Korea and northern Japan, and west and south to Tibet, Afghanistan, and the northwestern Himalaya. Two species occur in Europe in the Balkan peninsula (*S. vulgaris* and *S. Josikaea* Jacq.). The genus is represented in our flora by *S. vulgaris* which escapes sparingly from cultivation or persists in old plantings.

More than 20 species of *Syringa* are grown as ornamentals in gardens throughout the temperate world. By far the most popular species is *S. vulgaris*, represented by over 500 cultivars which have been developed by selection, cross-pollination of garden forms, or by the propagation of sports. Many of the older cultivars have already disappeared from gardens, but several hundred are still popular today.

Species of subg. SYRINGA do not hybridize with those of subg. LIGUSTRINA (Rupr.) K. Koch. Moreover, within subg. SYRINGA no hybrids have been obtained from crosses between species of different series, with the notable exception of ser. *Pinnatifoliae* Rehder, closely allied to ser. *Syringa* (ser. *Vulgares* Rehder). Both series were maintained, nevertheless, on morphological grounds in spite of the genetic compatibility between the two. Within each series there is a considerable amount of genetic compatibility, and many hybrids have been developed, often of great horticultural value, although many are sterile or lack vigor. More than 14 hybrids and their numerous cultivars, mostly in ser. *Syringa*, are in cultivation.

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[1] It is of interest that in many areas *Philadelphus* is known by the common name "Syringa."

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Tribe OLEINEAE Endl.

3. **Osmanthus** Lour. Fl. Cochinchin. 1: 28. 1790.

Evergreen shrubs or small trees; leaves opposite, simple, entire. Inflorescences axillary or terminal, cymes or panicles. Flowers bisexual or unisexual in various combinations, the plants dioecious, [monoecious, polygamous, or bearing only bisexual flowers]. Calyx 4-parted. Corolla imbricate, 4-parted, usually with a short tube. Stamens 2 (rarely 4), included. Pistil with a single style, the stigma capitate, entire (or 2-lobed), the ovary with 2 pendulous, anatropous ovules in each locule. Fruit a 1-seeded drupe. (Including *Cartrema* Raf., *Amarolea* Small.) TYPE SPECIES: *O. fragrans* (Thunb.) Lour. (The name from the Greek *osme*, fragrance, and *anthos*, flower, in reference to the fragrant flowers.) — WILD OLIVE, DEVILWOOD.

A genus of more than 30 species in at least four sections, primarily of eastern and southeastern Asia, but extending into Polynesia, with two to four species in North America and one or two species native to our area.

Osmanthus americanus (L.) Gray, with dark purple, ellipsoid, ovoid or subglobose fruits with stones pointed at both ends or only at the base, occurs in a variety of habitats (rich woods, hammocks, wooded bluffs, sand scrubs) from Florida to Louisiana, north to southeastern Virginia, and also in Mexico. The leaves are variable in texture and shape, the fruit in shape and size, and the inflorescence in length and compactness.

At least three variants of *O. americanus* have been described from peninsular Florida. *Osmanthus megacarpus* (Small) Small ex Little, from the sand hills of Highlands County at the southern end of the Lake Region, has very much larger, globose fruit, but the range in the fruit-size overlaps that of *O. americanus*. Purported differences in the stone are of no significance, since similar shapes occur in *O. americanus*; the two are otherwise very similar. On these bases the large-fruited plant has been treated as *O. americanus* var. *megacarpus* (Small) P. S. Green. *Osmanthus floridanus* Chapm., from "sandy pine barrens, Manatee, South Florida," was said to differ from *O. americanus* in having yellowish-green fruit and pubescent inflorescences. An additional possible species was postulated by Small in a plant from the northeastern coastal region with small, globose fruit, and a stone scarcely pointed at the base. The total variation is striking, particularly in Florida, but whether species based primarily on such differences in the fruit are valid is very problematic. A study, especially in the field, of population variations in leaves, fruits, and inflorescences, correlated with habitat differences, is much needed.

Osmanthus is equally puzzling in Mexico where *O. americanus* var. *americanus* occurs in Oaxaca and Veracruz, and a small-leaved plant with compact inflorescences, var. *microphyllus* P. S. Green, is known from two collections from Nuevo León. *Osmanthus mexicanus* Lundell, with elliptic to oblanceolate, acuminate leaves, is known only from the type collection from Chiapas and appears to fall within the range of variation of *O. americanus*.

The American species of *Osmanthus* belong to sect. LEIOLEA (Spach) P. S. Green (inflorescence paniculate, corollas small and of thin texture) which otherwise includes about seven species of tropical and subtropical eastern Asia. The American species have also been treated as a separate genus, *Cartrema* Raf. (*Amarolea* Small), particularly on the basis of the more elaborately branched inflorescence. *Osmanthus americanus* is a hexaploid ($2n = 138$), while four other species (Asiatic and none belonging to this section) are diploids ($2n = 46$). The problem of the generic status of the American species deserves further study, taking into account all of the other species of *Osmanthus* and those of closely related genera, including *Linociera*, *Notelaea*, *Olea*, *Phillyrea*, and *Steganthus* (cf. Green).

The remaining three sections are Asiatic. Section OSMANTHUS is represented in our area only in cultivation, most notably by the very fragrant *O. heterophyllus* (G. Don) P. S. Green (*O. ilicifolius* (Hassk.) Mouillef.), $2n = 46$, and *O. fragrans* (Thunb.) Lour., $2n = 46$, the latter not hardy much to the north. *Osmanthus* × *Fortunei* Carr. is a hybrid of these two species. The species of the Pacific area present a particularly perplexing

problem in the structure of their flowers and inflorescences. These may represent either a separate section or may constitute an independent genus (*Gymnelaea* (Endl.) Spach; cf. L. A. S. Johnson).

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4. **Forestiera** Poir. Encycl. Méth. Suppl. **1:** 32. 1810; **2:** 664. 1811 [1812].

Deciduous or rarely evergreen shrubs; leaves opposite simple, entire or serrate, short-petioled. Plants dioecious or polygamo-dioecious. Inflorescences axillary on the branches of the preceding year, the flowers clustered or in short racemes. Flowers apetalous, calyx minute, 4-parted or irregularly toothed, fugacious, or occasionally wanting. Staminate flowers mostly sessile, stamens 1–4, anthers oblong, 4-loculed, opening longitudinally, pistil wanting or rudimentary. Pistillate flowers on short, 1–3-flowered peduncles; abortive stamens 0–4; pistil with a slender style, the stigma simple or 2-lobed, the ovary with 2 pendulous ovules in each locule. Fruit a 1(rarely 2)-seeded black or dark-blue drupe. (*Adelia* P. Browne, nom. rejic., not L., nom. cons. [Euphorbiaceae]; *Borya* Willd., not Labill.) TYPE SPECIES: *Forestiera cassinoides* (Willd.) Poir. (*Borya cassinoides* Willd. = *Adelia cassinoides* (Willd.) O. Ktze.). (The name in honor of Charles Le Forestier, physician and naturalist during the early 1800's.)

A genus of perhaps 20 species ranging from Brazil northward through Mexico and the West Indies to the United States. The plants occurring in our area have been interpreted as representing three to six species.

The differences in interpretation of the species of this genus point to the lack of understanding of the biology of the group. The species have been distinguished on the basis of the time of flowering (i.e., before or after the leaves expand), the shape of the leaves, the shape of the fruit, the cutting of the leaf margin, the presence or absence of pubescence, and the persistence of the leaves. Additional information, particularly that based on field observation, is essential in this genus, and data on ecological variation, as well as any evidence of hybridization or introgression, should be accumulated.

The two most widely distributed species occurring in our area are *Forestiera acuminata* (Michx.) Poir., which ranges from Florida to Texas, northward to South Carolina, Tennessee, Illinois, Missouri, and Kansas

on river banks, in swamps and in hammocks, and *F. ligustrina* (Michx.) Poir., ranging from Florida to Texas, Georgia, Tennessee, and Kentucky, on rocky soils, sand dunes and in pinelands. *Forestiera segregata* (Jacq.) Krug & Urban (including *F. porulosa* (Michx.) Poir.) occurs in hammocks, marshes and low pinelands and ranges from the West Indies northward to Florida and Georgia (cf. Johnston).

Forestiera acuminata and *F. neo-mexicana* Gray have both been reported to have a diploid chromosome number of 46.

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5. **Chionanthus** L. Sp. Pl. 1: 8. 1753; Gen. Pl. ed. 5. 9. 1754.

Deciduous shrubs or low trees; leaves opposite, simple, entire, petioled. Inflorescences loose, drooping panicles, from the axillary buds near the end of the year-old branches. Plants polygamo-dioecious. Calyx 4(rarely 5)-parted. Petals white, narrow, linear, united at the base. Stamens 2 (rarely 3 or 4), short, on the base of the corolla, the anthers apiculate, 4-loculed. Pistil with a short style, the stigma 2-lobed, the ovary with 2 ovules in each locule. Fruit a 1(seldom 2)-seeded dark-blue, ovoid drupe. TYPE SPECIES: *Chionanthus virginicus* L. (The name from the Greek *chion*, snow, and *anthos*, flower, in allusion to the abundant white flowers.) — FRINGE-TREE, OLD-MAN'S-BEARD.

A genus of three or four species, two in eastern North America and one or two in eastern Asia. Both American species are native in our area, and *Chionanthus retusus* Lindl. & Paxt. (China, Korea, Japan) may be found in cultivation. *Chionanthus virginicus* L. ($2n = 46$), a tall shrub or tree to 10 m. in height, the flowers with acuminate anthers and petals 2–3 cm. long, occurs in swampy or damp woods, or on stream banks, or in much drier, rocky soils with *Pinus*, *Quercus* and *Carya*, ranging from Florida to Texas, northward to New Jersey, Pennsylvania, West Virginia, southern Ohio, southern Missouri, and Oklahoma. It is also widely cultivated. *Chionanthus pygmaeus* Small, a small shrub to 40 cm. in height spreading by underground stems, the flowers with blunt-tipped anthers and petals about 1 cm. long, is an endemic of the sand-scrub in the lake region of central Florida.

Differences in the pubescence and shape of the leaves, the size of the flowers and the length of the petals are apparent between the more northern

plants of *Chionanthus virginicus* and those of peninsular Florida. The significance of the variation in this species is as yet obscure.

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6. **Ligustrum** L. Sp. Pl. 1: 7. 1753; Gen. Pl. ed. 5. 8. 1754.

Deciduous or evergreen shrubs or small trees; leaves opposite, simple, entire. Inflorescences terminal panicles. Flowers white, bisexual. Calyx campanulate, 4(or irregularly)-toothed. Corolla funnelform, 4-lobed, the lobes as long as the tube or much shorter. Stamens 2, inserted on the tube of the corolla, included or exserted. Pistil with a single style, the stigma 2-lobed, the ovary with 2 pendulous, anatropous ovules in each locule. Fruit a 1–4-seeded berry with membranous to stony endocarp; [fruit dehiscent in *L. sempervirens*]. TYPE SPECIES: *L. vulgare* L. (*Ligustrum*, the classical name of *L. vulgare*.) — PRIVET.

A genus of about 30 species in three sections, chiefly of eastern Asia and Malaysia to Australia, one species (*L. vulgare* L.) in Europe and North Africa. A number of species are widely cultivated as ornamental shrubs for their foliage and attractive small, white flowers. The species represented in our flora are all escapes from cultivation; others in cultivation may also be expected to escape.

The most widely cultivated and best-known species is *Ligustrum vulgare* L. ($2n = 46$), sect. LIGUSTRUM (sect. *Baccatae* Mansf.) (endocarp membranous, seeds 2–4), which has become widely naturalized in thickets and open woods throughout much of eastern North America.

Section SARCOCARPION (Franch.) Mansf. (endocarp dehiscent, seed 1) consists of a single species, *L. sempervirens* (Franch.) Linglesh. from western China, which is now sparingly cultivated and probably not at all represented in our area.

All other species of the genus belong to sect. SUBDRUPACEA Mansf. ("Subdrupaceae") and at least three have become established in our area. *Ligustrum ovalifolium* Hassk. is extensively naturalized along roadsides and in disturbed areas on the coastal plain and in the piedmont from Virginia southward. Plants identified as *Ligustrum sinense* Lour. have become established in North Carolina, South Carolina, Alabama, and Louisiana, where they may grow in large stands which, when in flower, saturate the area with an unpleasant, penetrating odor. Some question exists with respect to the taxonomy and nomenclature of this plant, but the solution

must await a study of the Chinese species of the genus. Reports of *Ligustrum amurense* Carr. in southeastern Virginia apparently are based on fruiting material only; these specimens seem to be identical with our *L. sinense*, but flowering material is needed to verify this identification. *Ligustrum lucidum* Ait. ($2n = 46$), and *L. obtusifolium* Sieb. & Zucc. ($2n = 46$) have been reported in scattered localities from eastern Pennsylvania, Virginia, or North Carolina southward. *Ligustrum Quihoui* Carr., which is cultivated in the Southeast, has been reported as an escape in northern Virginia and may well occur elsewhere. Conscientious collecting is very much needed to determine the present distribution and future spread of these Asiatic species. Key characters are based primarily on flowering specimens, but fruiting specimens should also be collected whenever possible.

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Subfam. JASMINOIDEAE Knobl.

Tribe JASMINEAE R. Br.

7. **Jasminum** L. Sp. Pl. 1: 7. 1753; Gen. Pl. ed. 5. 7. 1754.

Deciduous or evergreen, erect or climbing shrubs; leaves opposite or alternate, simple or pinnately compound. Inflorescences terminal or axillary on year-old branches, cymose (flowers rarely solitary). Flowers bisexual. Calyx campanulate or funnelform, 4–9-lobed, the lobes of varying length. Corolla yellow or white, [pink or red,] salverform, 4–9-lobed, the tube

cylindrical. Stamens 2, included. Pistil with a single style, the stigma 2-lobed, the ovary 2-loculed, each locule with 1–4 amphitropous and ascending, or seldom anatropous and pendulous, ovules. Fruit a 2-lobed berry, each locule with 1 or 2 seeds, 1 of the 2 carpels often failing to develop. TYPE SPECIES: *J. officinale* L. (*Jasminum*, the latinized Arabic name.) — JASMINE.

A genus of about 200 species in four sections, chiefly tropical and subtropical, occurring in eastern and southern Asia, Malaysia, Africa, and Australia, with a single species (*J. lanceolatum* Ruiz & Pav.) in tropical America (Peru). Many species are widely cultivated as garden ornamentals, and several have escaped from cultivation and have become naturalized in tropical and subtropical areas. Although poorly represented in herbaria, at least four species are known to be established in the flora of our area.

Section ALTERNIFOLIA DC. (leaves alternate, simple or compound or both) is represented in our area only in cultivation by *J. humile* L. ($2n = 26$), from eastern Asia, and perhaps others.

Section TRIFOLIOLATA DC. (leaves opposite, trifoliolate) includes *J. Mesnyi* Hance ($2n = 24, 26$), from western China, an evergreen, rambling shrub with bright yellow, often double, flowers and a foliaceous calyx, which has been reported to have escaped cultivation in Georgia. *Jasminum azoricum* L., from the Canary Islands, an evergreen climber with white flowers, has become established in Key West. In addition to these, *J. nudiflorum* Lindl. ($2n = 52$), from China, a shrub with arching branches and one of the hardiest species, is widely grown for its bright yellow flowers which appear in earliest spring.

Section UNIFOLIOLATA DC. (leaves opposite, simple) is represented by *J. Sambac* (L.) Ait. ($2n = 26, 39$) and *J. amplexicaule* Wallich ex Don (= *J. undulatum* Kerr.), both of which have become established in woods and thickets in Florida. At least *J. gracillimum* Hook. ($2n = 26$) and *J. multiflorum* (Burm. f.) Andr. ($2n = 26, 39$) are also in cultivation.

Section JASMINUM (§ *Pinnatifolia* DC.) (leaves opposite, five-foliolate or more) includes *J. officinale* L. forma *grandiflorum* (L.) Kobuski ($2n = 26$), a deciduous shrub with large, white flowers, which is known both in cultivation and as an escape in pinelands and thickets in southern Florida.

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